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Notes on the pigmentation pattern in the larval developmental stages of laboratory-reared milkfish

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One of the many characteristics for identifying fish species during their early stages of development is the distribution of pigment cells or chromatophores on the fish body. Delsman (1926, 1929-30) was probably the first to describe the pigmentation pattern of milkfish fry. However, due to the limited number of specimens, he was not able to describe the pigmentation pattern of all the larval developmental stages of the fish. Recently, Vanstone et al. (1977) and Chaudhuri et al. (1977), who succeeded in inducing milkfish to spawn in captivity, in successfully fertilizing its eggs and in rearing some of the resultant larvae to the fry stage, gave a description of the pigmentation pattern in some stages of the larval development in laboratory-reared milkfish.

The specimens used in this work were artifically bred and reared in the laboratory by Liao et al. (1979 in preparation). Since a detailed description of the development of the larva has been made by Liao et al. (1979 in preparation), only the pigmentation pattern of the different developmental stages of the larva will be described in this paper.

The specimens used in this study are mostly preserved in 5% buffered formalin. For this reason, only one type of the chromatophores, i.e. the melanophores, are described. The pattern of melanophore distribution on the different parts of the fish body during its development after hatching to the late fry stage are presented and shown respectively in Fig. I to III. In Fig. V a schematic illustration of the different types of chromatophores is shown as an aid to better understand the description.

From the preserved materials it is not possible to make conclusive statements as to whether the melanophores which appear on the dorso-ventral portion of the fish body are newly formed or whether they come from those melanophores found on the fin folds of the larva which have gradually moved towards the body myotomes. The pigmentation pattern as shown from the dorsal view (Fig. IV) does not also clearly show any specific developmental pattern. The types of melanophores seem to oscillate back and forth between punctate, stellate, stellate-reticulate and reticulate wherein dendritic processes from adjacent cells may touch each other forming a continuous sheet of pigments (Bagnara and Hadley, 1973; Hamilton, 1973).

To date, studies on pigmentation in animals are few – the reason, perhaps, as to why the ecological and biological significance of coloration is not very well understood. However, the development of pigments in some organs could easily be explained since their function or significance is obvious. For example, the melanophores on the outer and inner wall of the eyeballs and the irridophores on the retina serve as optical screens and reflectors of the eye. The large stellate melanophores found permanently on the dorsal side of the gas bladder probably serve to cover the light reflecting property of the gas bubble, thus exposing the fry to predators especially at night when there is nocturnal illumination. The counter shading effect of pigments is evident in the late fry stage where most of the pigments are found on the dorsal half of the body surface instead of the internal organs. Furthermore, the belly region becomes more equipped with irridophores, thus protecting the heavily pigmented peritoneal membrane.

Aside from the few obvious functions mentioned above, the function and/or significance of pigments which are located in the other parts of the body and which appear only at certain stages of development of the fish is difficult to explain. It should be stressed, however, that pigmentation represents a kind of factor that is important to the animal at different stages in its life span in terms of biochemical and biological functions (Waring, 1963; Florey, 1966; Bagnara and Hadley, 1973; Hamilton, 1973; Bagnara, 1976; Hinton, 1976).

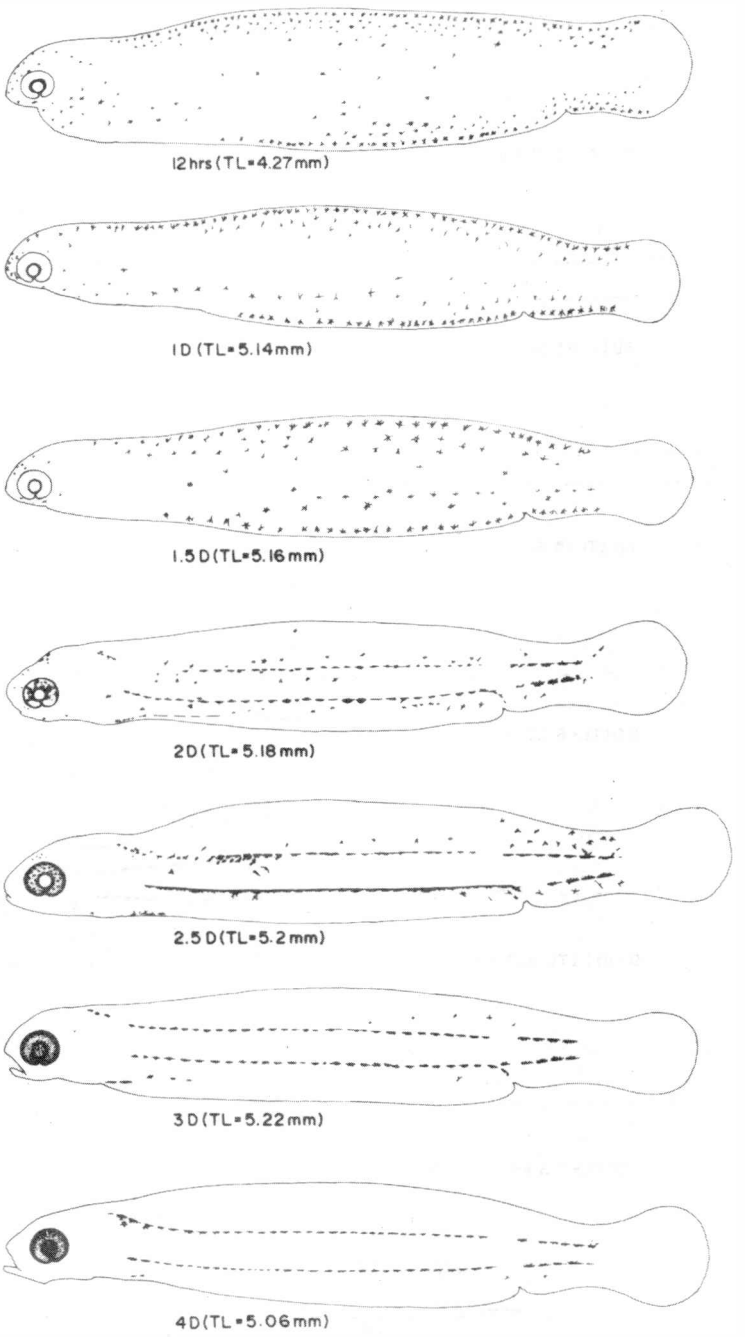

Fig. 1. Pigmentation pattern of 12 hrs to four days old milkfish larva.

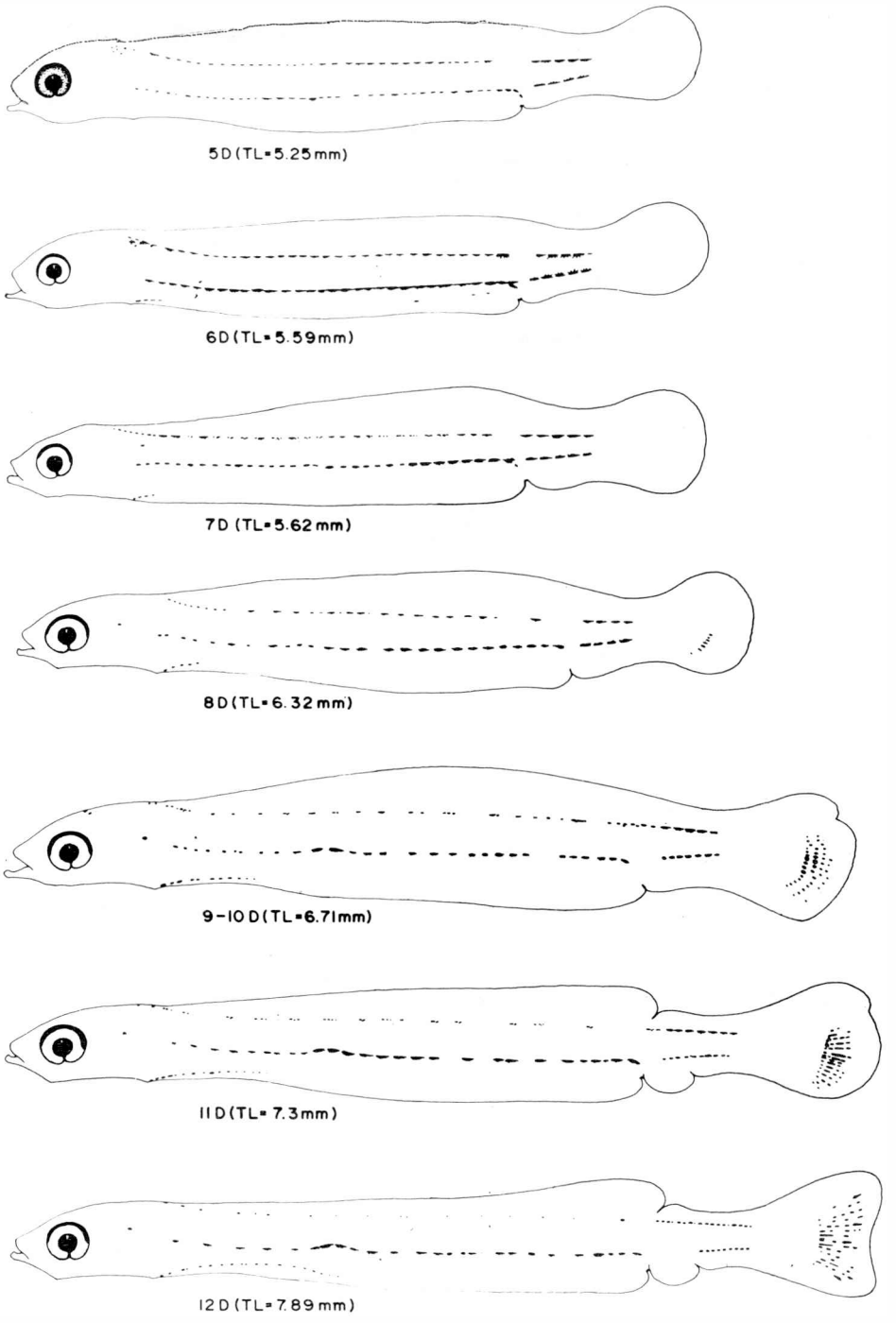

Fig. 2. Pigmentation pattern of 5 to 11 days old milkfish larva.

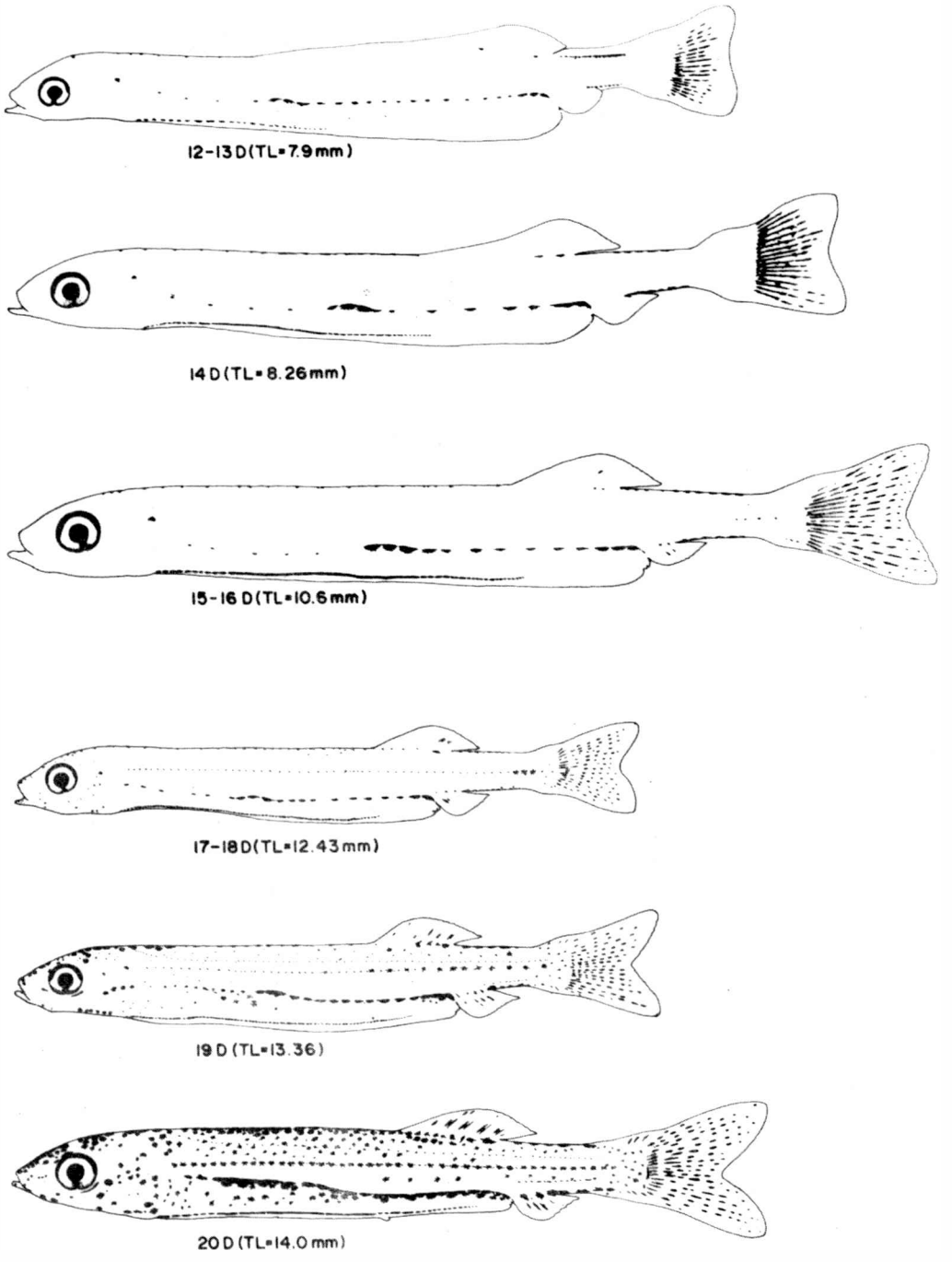

Fig. 3. Pigmentation pattern of 12 days to 20 days old milkfish larva.

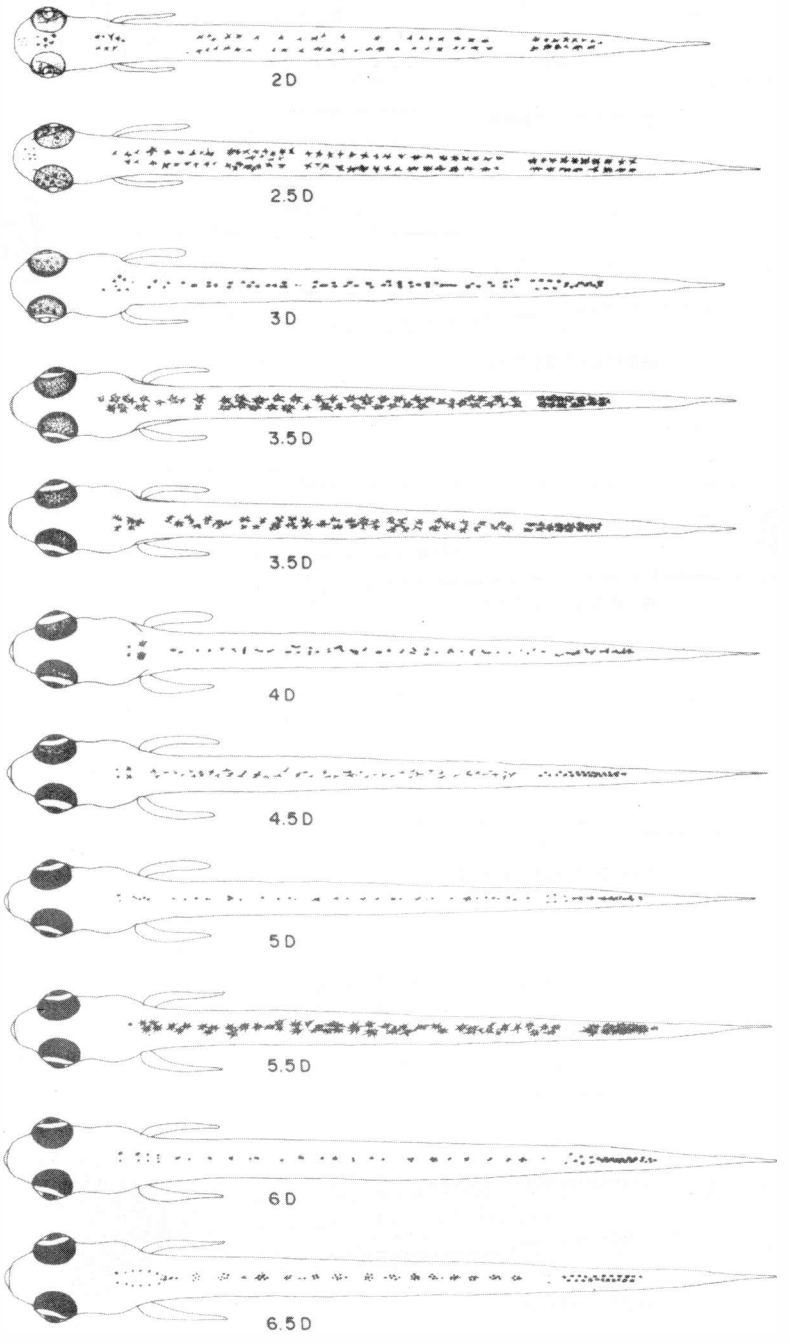

Fig. 4. Dorsal view of pigmentation pattern of two days to six and a half days old milkfish larva.

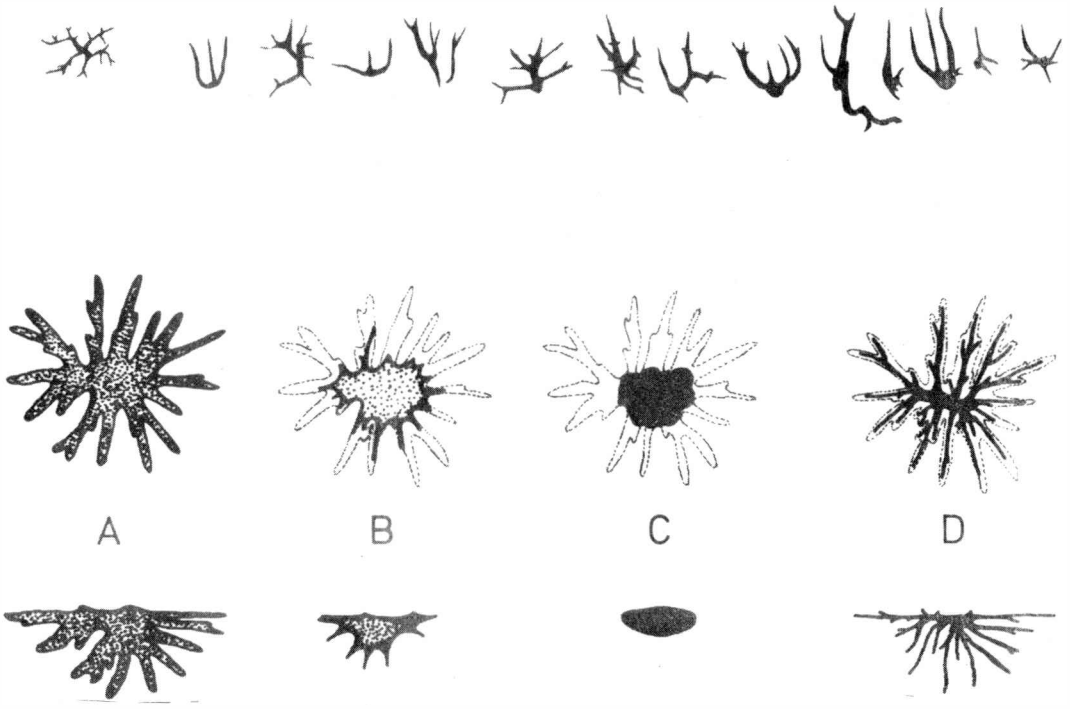

Fig. 5. Schematic illustration of different types of melanophores found on the body of milkfish larva, fry and late fry stages.
Upper row shows derdritic types of melanophore found on the finfold of newly hatched larva.
A, stellate reticulate, B stellate, C punctate, D reticulate type of melanophore as seen from dorsal (upper row) and lateral view (lower row).

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